EVEREX

Magic I/O™
Input/Output Adapter for the IBM PC/XT/AT

OWNER'S MANUAL AND REFERENCE GUIDE
EV-170 and EV-170A
(VERSION 3.0)

EVER for EXcellence

MAN-00054-30

Magic I/O™

Input/Output Adapter for the IBM PC/XT/AT

OWNER'S MANUAL AND REFERENCE GUIDE
EV-170 and EV-170A
(VERSION 3.0)

Notice

Everex Systems, Inc reserves the right to make improvements in the product described in this manual at any time and without notice.

The IBM PC, XT, AT and Portable are trademarks of International Business Machines Corporation.

MS DOS is a trademark of Microsoft Corporation.

This manual is copyrighted. All rights are reserved. This document may not, in whole or part, be copied, photocopied, reproduced, translated or reduced to any electronic medium or machine readable form without prior consent, in writing, from Everex Systems.

(c) Copyright September, 1986
Everex Systems, Inc.

Warning

WARNING: This equipment generates and uses radio frequency energy and if not installed and used in strict accordance with the manufacturer's instructions, it may cause interference to radio and television reception. It has been certified and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1) Reorient the receiving antenna.

2) Reorient the computer with respect to the receiver.

3) Move the computer away from the receiver.

4) Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

5) Ensure that card mounting screws, attachment connector screws, and ground wires are tightly secured.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio TV Interference Problems." This booklet is available from the US Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4 (FCC, Part 15.838 b).

Notes

Table of Contents

INTRODUCTION 2

GETTING STARTED 3

INSTALLATION 4
Setting Up Your Board 4
Setting The Switches And Jumpers.......... 10
Physically Installing The Mini Magic I/O.......... 20
Testing The Mini Magic I/O.......... 23

APPENDIX I: THE EVERCLOCK SOFTWARE 24

APPENDIX II: PC-WRITE 26

APPENDIX III: HANDSHAKING SCHEMATIC 27

DISCLAIMER: While we do our best to avoid such a situation, Everex Systems will not be responsible for any loss of information resulting from the use of the product.

Introduction

The Everex Magic I/O is the most versatile multifunction I/O card you can buy. With a parallel printer port, two serial ports (one standard and one optional), and a real time clock, the Magic I/O packs more features and connectors on a true 5" short card than do most full-length multifunction cards. Additionally, all of the functions of the Magic I/O are fully configurable: you can easily select interrupts, LPT ports, COM ports and other values to best customize the Magic I/O to any IBM-compatible system. This flexibility is your guarantee that the Magic I/O will work in more systems, with more combinations of hardware and software, than any other I/O card on the market.

To complement its many features the Magic I/O comes with a menu-driven diagnostics/set-up utility program (*EV170.EXE*) which will guide you through t+e configuration of your board and will test the board once it is installed.

This manual will provide you with all of the information that you need to install and use your Mini Magic I/O. First time users should read the chapter entitled *Installation;* this chapter will lead you through the installation process with explanations on what to do and why. Those users who have already had experience installing boards in a computer need only read the *Getting Started* chapter which provides an outline of the installation procedures. Each step of this procedure is described in detail in a section of the *Installation* chapter.

Getting Started

Below is a brief description on how to install the Mini Magic I/O. If multifunction cards are new to you, jump to the *Installation* chapter.

1. First, decide how you are going to configure each port, and set the switches and jumpers on the Mini Magic I/O to correspond with these choices. (This may be done with the help of the utility program (**EV170.EXE**) that accompanies the Mini Magic I/O or following the tables in the *Configuring Without The Software* section of the *Installation* chapter. We highly recommend using the software.)

2. Install the board into your system.

3. If you have an AT, run the AT Advanced Diagnostics *Setup* program.

4. Run the test program which accompanies the Mini Magic I/O. To access this program, insert the Mini Magic I/O utility diskette into the floppy drive, type **EV170** <Enter>, and choose the *Installation Setup* option.

5. Replace the system's cover.

6. Congratulations. You have completed the installation procedures, and your system is ready for use.

SETTING UP YOUR BOARD

Before it can be put into your system, the Mini Magic I/O must be configured to suit your individual usage. Below are a few questions that will help you decide how to configure the board. Following the questions is a section on how to set the switches and jumpers.

The Ports

The board comes from the factory with the parallel port enabled in the printer mode and set as LPT1 at IRQ7; the 9 pin serial port enabled and set as COM1, IRQ4, and as DCE device with no force-trues.

Note: The optional 25 pin serial port 2 is set as COM2 and IRQ3 as a DCE device with no force-trues.

If you will be using this setup, skip to the section on *Using The Software To Configure Your Mini Magic I/O*. If not, you will need to change some switch and/or jumper settings on the board. The information below will explain what you will need to do.

The Serial Port

The Mini Magic I/O comes with two asynchronous serial ports: one with a 9-pin connector and one with a 10-pin connector.

Note: The board is shipped from the factory with one communications chip which will allow you to use the 9 pin serial port. If you wish to use the optional 25 pin serial port, you will need to purchase another more chip from your dealer and install it in the empty socket. You will also need to purchase a special 10 pin to 25 pin cable from your dealer.

To set your serial port switches and jumpers, you will need to answer the following questions:

1. Will each active port be designated as **Com 1, Com 2, Com 3,** or **Com 4** or will it be disabled?

   Each serial port in your system must be assigned to a different COM port, which allows the CPU to send and receive data through the serial port. Each COM port has a corresponding port address; so, by setting the COM port number, you are also setting the port address.

Check to see what COMs your software will respond to and be sure to configure your software to run off of the same configuration as your Mini Magic I/O.

2. At what interrupt level do you wish to set the serial port?

   In order for a device to draw the attention of the computer that it is ready for instructions, it signals the computer using interrupts.

   The Mini I/O serial ports can be set to use IRQ2, 3, 4, or 5. Note that in the IBM PC or PC/XT you can not use IRQ2.

3. Do you want to set the port as DTE or DCE?

   A communication device can either be **D**ata **T**erminal **E**quipment or **D**ata **C**ommunication **E**quipment. In order for two communication devices to communicate, an exchange of control signals must occur. These signals will be carried through the interface (or connection) of the DTE connector and the DCE connector. Each pin of the connector will carry a different signal. The arrangement of these signals is predetermined and will vary depending on whether the device is DTE or DCE. The exchanging of these signals between the DTE device and the DCE device is called *handshaking*.

Check your serial device's manual to see if it requires a **DTE** (Data Terminal Equipment) or a **DCE** (Data Communication Equipment) connection.

4. Do you want for the force-true to be on?

Most of the devices that you could attach to a serial port will do their part in the handshaking process and, at the appropriate times, will send the required signals. There are certain devices that do not provide some or all of the required functions for handshaking. For example, the null modem will not send the DSR (**D**ata **S**et **R**eady) signal; if you attach a null modem to your computer, your system will wait forever for the expected DSR signal.

In these special circumstances, you can force the Magic I/O's serial ports to provide the missing signals, thus enabling communication with devices that don't "shake hands."

There are four possible force-trues for the 9-pin serial port: DSR for Data Set Ready, CTS for Clear To Send, DCD for Data Carrier Detected, and RI for Ring Indicator. Check your software's manual to see which you will need to use.

The Parallel Port

The parallel port uses the larger of the two connectors on the endplate. To set the parallel port, you will need to answer the following questions:

1. The Magic I/O lets you assign its parallel port either as a printer port or a general I/O port. As which do you wish to assign the parallel port?

2. At which interrupt level do you wish the parallel port to be set?

2. Do you want it to be set as LPT1, LPT2, or LPT3?

   The LPT (short for Line PrinTer) is a pre-defined block of memory addresses of the computer. There are three defined LPTs: LPT1, LPT2, and LPT3. The default setting of the Magic I/O is for LPT1.

   Note: If you have chosen to use the parallel port as a general purpose I/O port, the LPT should be disabled.

3. What will the port address be?

The Real Time Clock

The Magic I/O has an on-board clock/calendar with battery backup to store the time and date, even when your PC is turned off. This frees you from having to re-enter the correct time and date every time you boot up.

Note: If you have an AT, your system already has a real time clock on board; therefore, your Magic I/O does not include a real time clock. You need not read any thing concerning the real time clock.

The port address of the clock/calendar is 2C0-2DF Hex.

1. Do you want to use enable the real time clock?

2. If you will be using the real time clock, at what interrupt should it be set?

Note: If you will be using the real time clock on a PC or XT, you should refer to the appendix on the Clock Software once the installation is completed.

SETTING THE SWITCHES AND JUMPERS

Next, you will need to relay this information to the Mini Magic I/O. You communicate with the board through its jumpers and switches. Each time that a jumper or switch is changed, a different bit of information is conveyed to the board. Below is a diagram of the Mini Magic I/O. All of the switches which tell the board about the memory and the ports are pointed out.

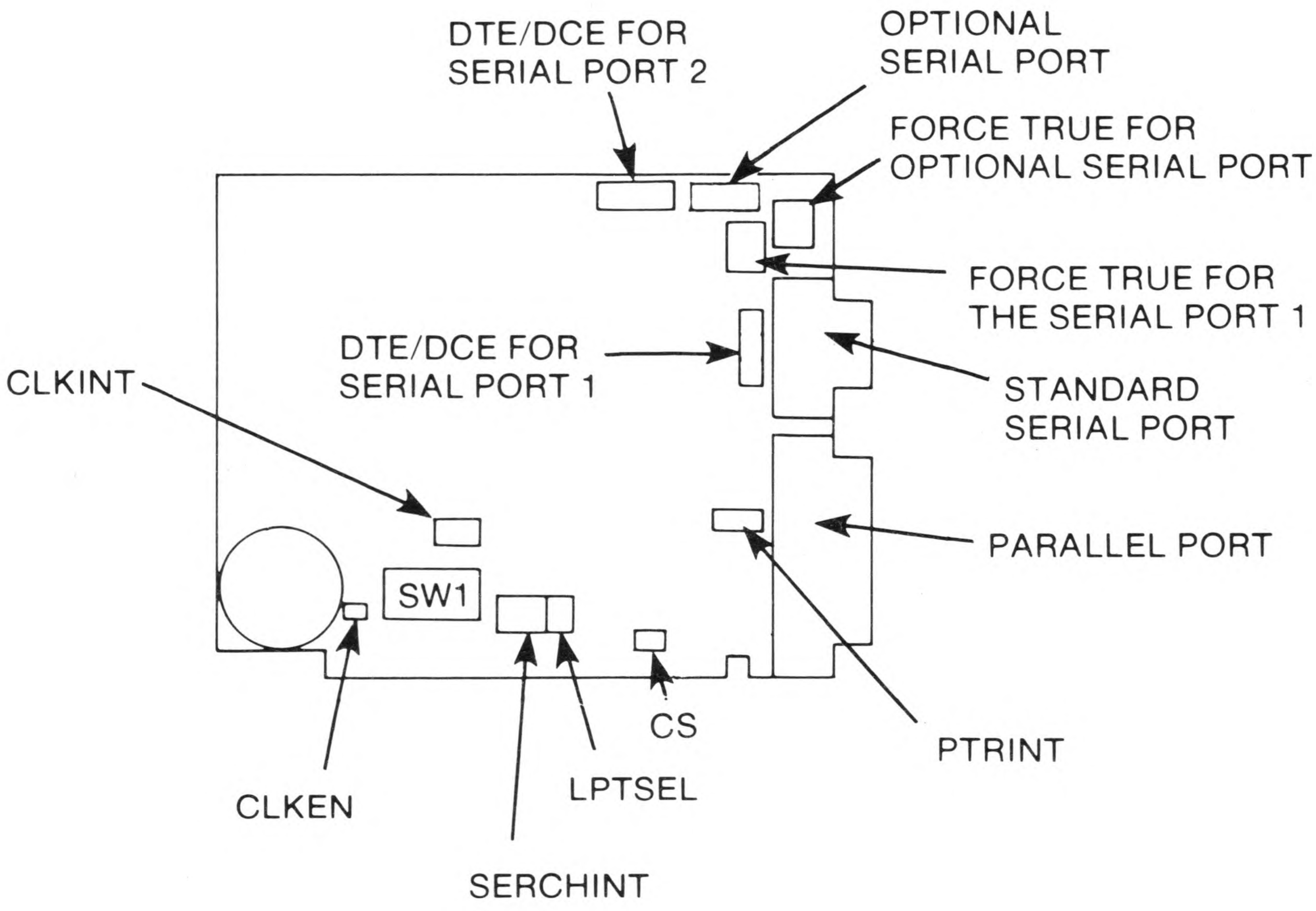

DTE/DCE FOR SERIAL PORT 2
OPTIONAL SERIAL PORT
FORCE TRUE FOR OPTIONAL SERIAL PORT
FORCE TRUE FOR THE SERIAL PORT 1
DTE/DCE FOR SERIAL PORT 1
CLKINT
STANDARD SERIAL PORT
PARALLEL PORT
SW1
CS
PTRINT
CLKEN
LPTSEL
SERCHINT

Figure 1: The Mini Magic I/O

If you have not already done so, remove the Mini Magic I/O from its box. Locate all of the key areas which are pointed out in the preceding figure.

Note: There are different types of switches. Please check your board to be sure that you know how to set your switch ON and how to set it OFF.

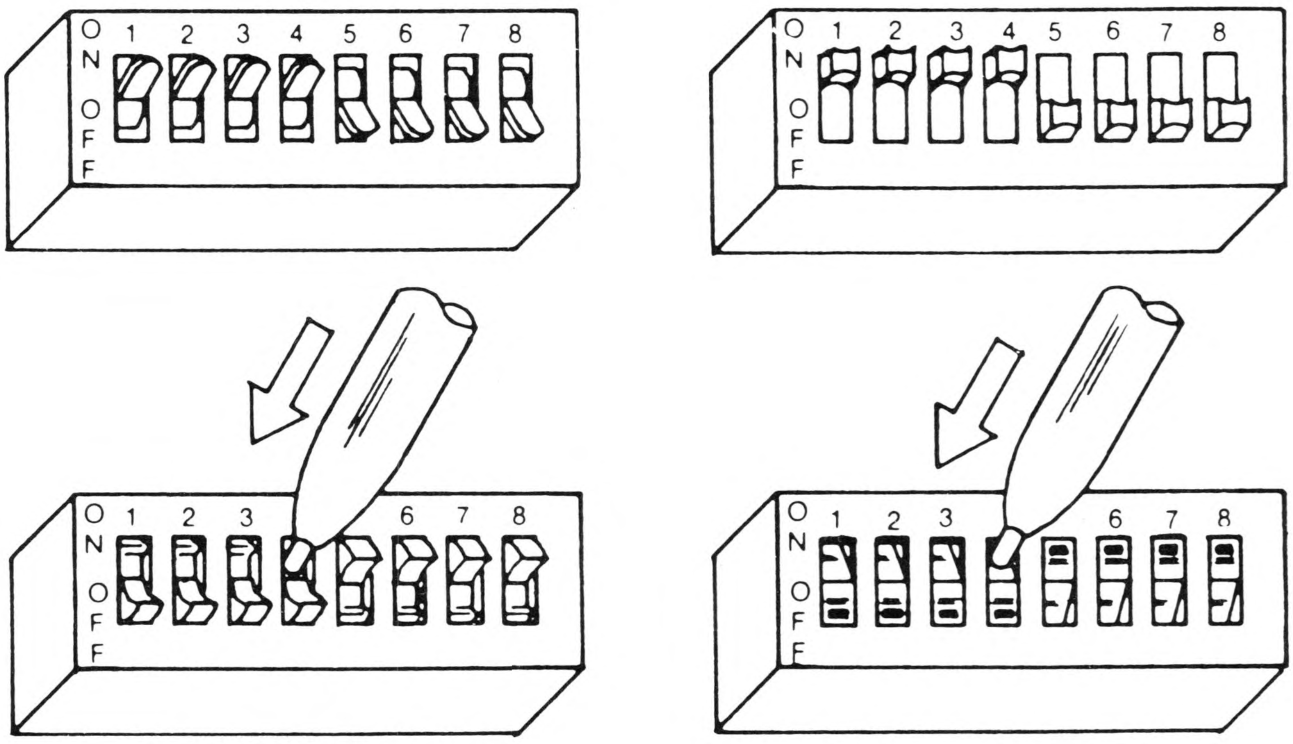


Figure 2: The Different Types Of Switches

An Installation program is included on the Mini Magic I/O Utility diskette which will simplify the configuration procedures. For those of you who choose not to use this program, all of the necessary information for setting up your Mini Magic I/O is provided in this manual. (We strongly advise using the software program.) Please read on to see what you need to consider when setting up your board.

If you will not be using this program, please skip to the section on *Configuring The Mini Magic I/O Without The Software.*

Using The Software To Configure The Mini Magic I/O

This section will describe how to access and use the Installation program to set up your Mini Magic I/O.

1. Boot up your computer with DOS, and insert the Mini Magic I/O Utility diskette into drive A:.

2. Type:

   A:EV170

   Note: To choose an option, use the arrow keys to move the highlighted area to the option you desire, then hit <Enter> to activate your choice.

   The utility main menu will appear on the screen. Since you are concerned with installing your Mini Magic I/O, choose the *installation setup* option.

3. Next, you will be asked to choose which adjustments you wish to make.

   After the software has asked you all pertinent questions, the screen will display a picture of the Mini Magic I/O and will show you what you need to set. Set the switches/jumpers on your board to correspond with those "set" on the screen.

You can now skip the next section.

Configuring The Mini Magic I/O Without The Software

If you will not be using the software to arrive at the jumper and switch settings, please read this section.

The serial port

On the Mini Magic I/O, the jumper SW1 selects the COM port for the serial ports. The factory default setting is COM 1 for Serial Port 1 and COM 2 for Serial Port 2.

Use the following table(s) to configure the port(s).

TABLE 1
COM PORT JUMPER SETTINGS AND PORT ADDRESSES
FOR THE SERIAL PORT 1 (SW1)

	SWITCH			
COM	1	2	3	4
1	▀	▄	▄	▄
2	▄	▀	▄	▄
3	▄	▄	▀	▄
4	▄	▄	▄	▀
DISABLED	▄	▄	▄	▄

▀ ON—PUSH SWITCH UP

▄ OFF—PUSH SWITCH DOWN

TABLE 1A

COM PORT JUMPER SETTINGS AND PORT ADDRESSES FOR THE SERIAL PORT 2 (SW1)

	SWITCH			
COM	5	6	7	8
1	▀	▄	▄	▄
2	▄	▀	▄	▄
3	▄	▄	▀	▄
4	▄	▄	▄	▀
DISABLED	▄	▄	▄	▄

▀ ON—PUSH SWITCH UP

▄ OFF—PUSH SWITCH DOWN

Note: COM 1 is port address 3F8; COM 2 is port address 2F8;
COM 3 is port address 3E8; COM 4 is port address 2E8

Do NOT assign two COM ports to the same serial port.

Each serial port in your system also requires an interrupt level. The serial port interrupts are selected by the jumpers on SERCHINT (**Ser**ial **Ch**annel **Int**errupt).

Use the table(s) below to select your serial port interrupt(s).

TABLE 2
INTERRUPT JUMPER SETTINGS
FOR THE SERIAL PORTS (SERCHINT)

	IRQ				
	3	4	5	2	
	■	■	■	■	IRQ assigning for Serial Port 2
IRQ assigning for Serial Port 1	■	■	■	■	
	■	■	■	■	

Note: To disable the IRQ, do not use any jumpers.

To choose either DTE or DCE:

For the serial ports there are two blocks of DCE/DTE jumpers on the Magic I/O labeled S.CH1 (for Serial Port 1) and S.CH2 (for Serial Port 2). In the factory default DCE setting, all six shunts are connecting both rows of pins. To set the serial port for DTE, change the connections of the shunts, as shown below. This drawing applies for both sets of jumpers.

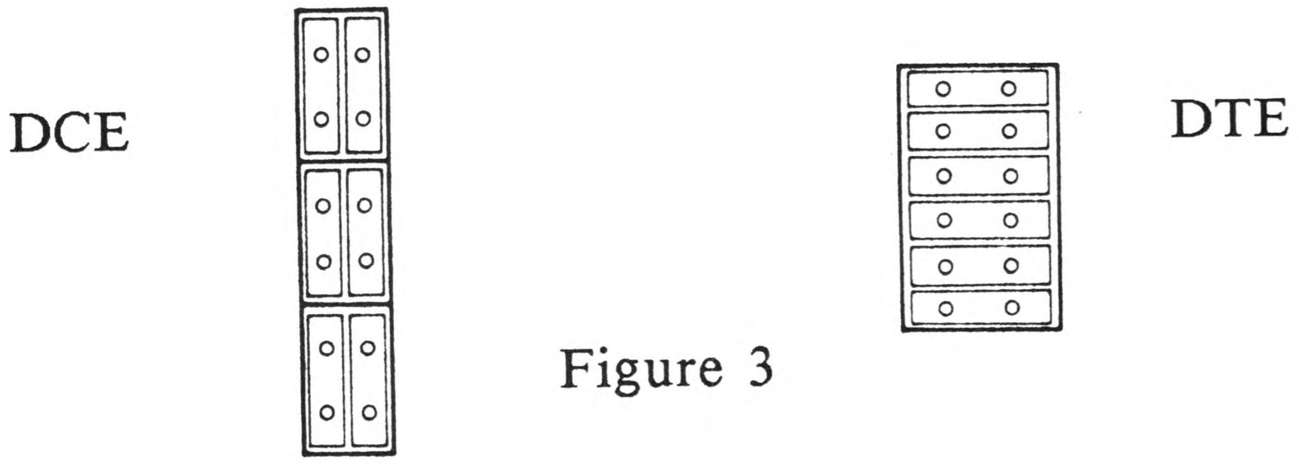


Figure 3

Force-trues

The jumper block to enable force-trues is called W15 (for serial port 1) and WX (for Serial Port 2). For each three-pin row, the shunt connecting the left and center pins disables force-trues, while moving the shunt to the right and center pins enables it. See the figure below.

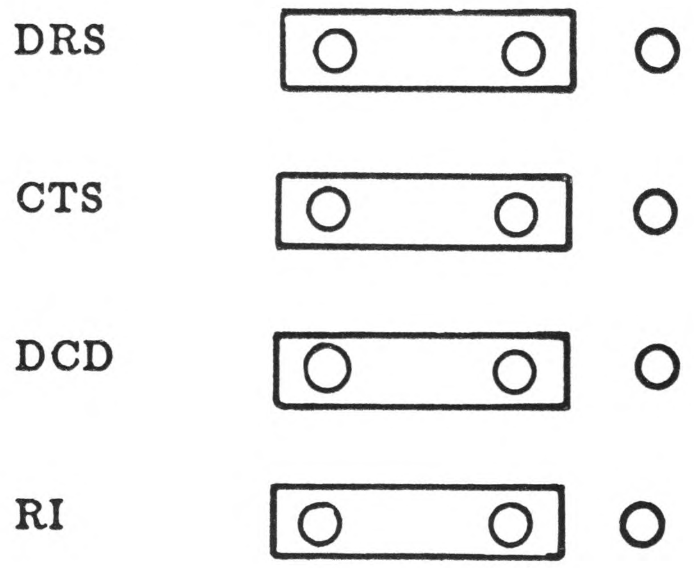


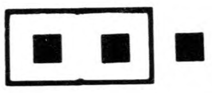
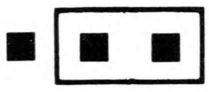
Figure 4: Setting No Force-Trues (W15)

If you need to enable any force-true signals, be careful to use the jumpers that correspond to the correct serial port. Do not, for example, move all the force-true shunts for Serial Port 1 and then connect your null modem to Serial Port 2.

Parallel Port

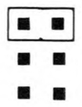
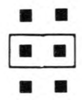
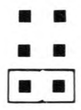
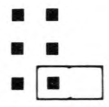
The Magic I/O's parallel port is configured at the factory as a printer port. First, you will need to set the interrupt for the parallel port.

TABLE 3
INTERRUPT SETTING FOR
THE PARALLEL PORT (PRINT)

IRQ	PTRINT SETTING
5	
7	

Now, you should set the LPT name. This is done by adjusting the jumpers on LPTSEL as shown in the following table.

TABLE 4
LPT JUMPER SETTINGS (LPTSEL)

LPT	PORT ADDRESS	LPTSEL SETTING
LPT 1	378-37F	
LPT 2	278-27F	
LPT 3	3BC-3BF	
DISABLED	N/A	

Note: Only one LPT may be selected for the parallel port at any time.

NOTE: LPT1, LPT2, and LPT3 are logical designations only. Depending on the other equipment present in your system, the LPTs may not always remain at their hardware-assigned settings.

The Real Time Clock

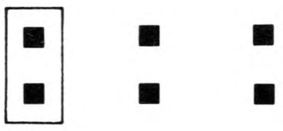
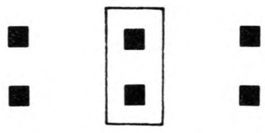
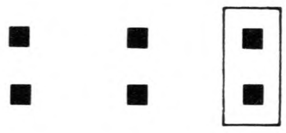
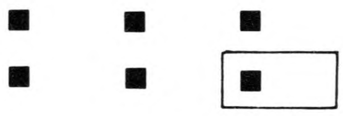
Note: If you have an EV-170A.... Since an AT system already has a real time clock, the Mini Magic I/O (EV-170A) does not have the clock circuit on board. You should, therefore, skip this section.

The clock/calendar is enabled at the two-pin jumper CLKEN, (Clock Enable). If you are going to install the Magic I/O in a machine that already has a clock/calendar (the IBM AT and most compatibles are in this category), you can disable the Magic I/O's clock/calendar by removing the black plastic shunt from the CLKEN jumper. If you do remove the shunt, put it back over only one pin for safekeeping.

The clock/calendar requires an interrupt level which is set by the CLKINT (**Cl**ocK **Int**errupt) jumper, which selects the clock/calendar interrupt. Table 5 gives you the possible interrupt levels of the clock/calendar and the CLKINT settings for each.

TABLE 5

MAGIC I/O CLKINT JUMPER SETTINGS

INTERRUPT	CLKINT SETTING
IRQ 2	
IRQ 5	
IRQ 7	
DISABLE	

PHYSICALLY INSTALLING THE MINI MAGIC I/O

Once the jumpers and switches have been set and the chips have been inserted, you can install the board into your computer.

1. If you will not be using either of the optional 25 pin serial ports, skip to step #2. If you will be using either of the optional 25 pin serial ports, you will need to make some adjustments before continuing.

   When you order a Magic I/O with one or more optional serial ports, you should receive a special ribbon cable with a ten-pin female connector at one end and a 25-pin male connector at the other end, for each port. The ten-pin end connects to the upper right corner of the Magic I/O, as shown in the following figure.

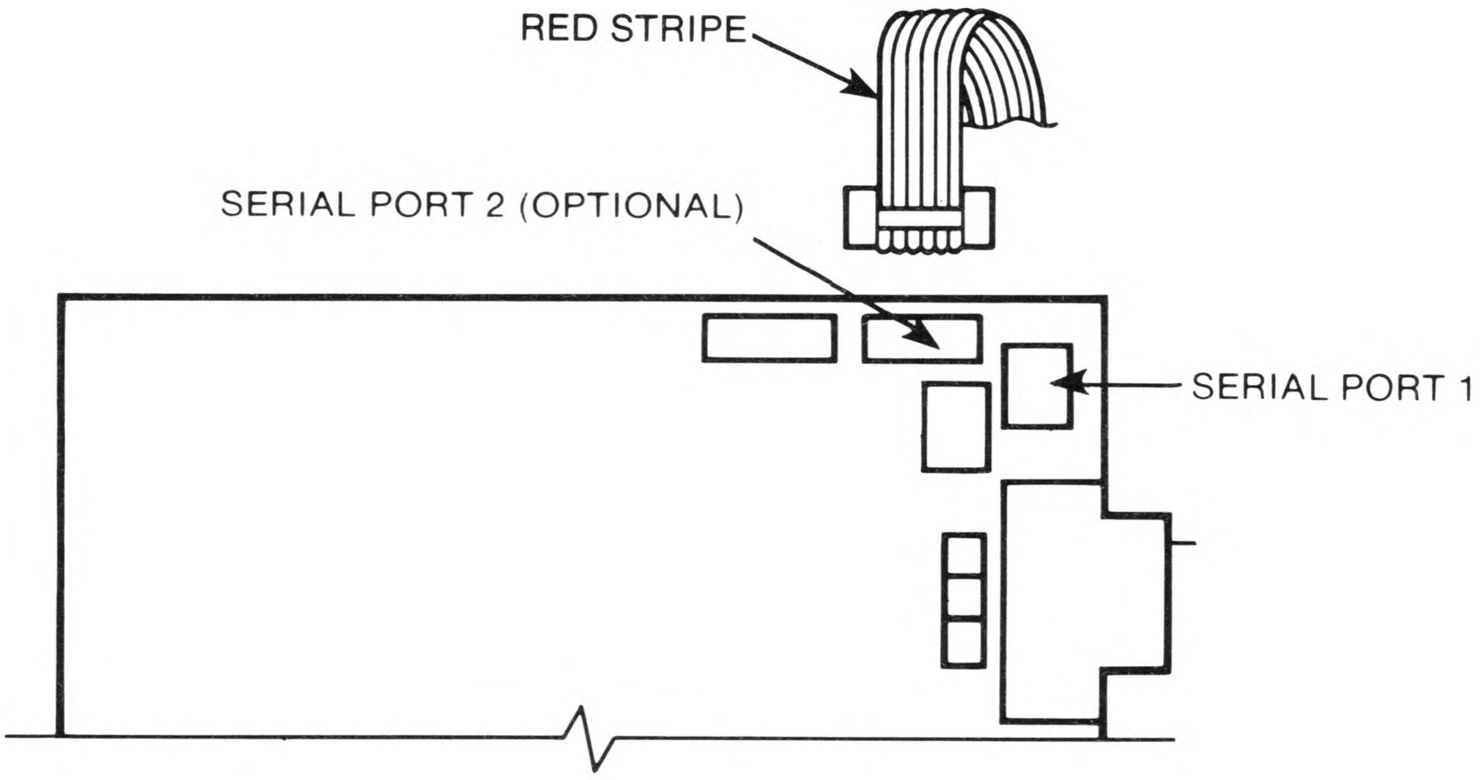


Figure 5: Serial Port Connectors on the Magic I/O

In addition to the special cable, a special IC chip is required to implement the second serial port. These chips are labeled 8250 for the XT and 16450 for the AT.
Note: The connectors that correspond to each serial port are permanently assigned and cannot be reversed.

2. Remove the cover of your system.

3. Choose any expansion slot on the mother board.

4. Remove the **expansion slot cover** from the back of the chosen expansion slot. To do this, you will need to unscrew the screw which holds the metal cover in place. You should save the screw, as you can use it to secure the Mini Magic I/O into place.

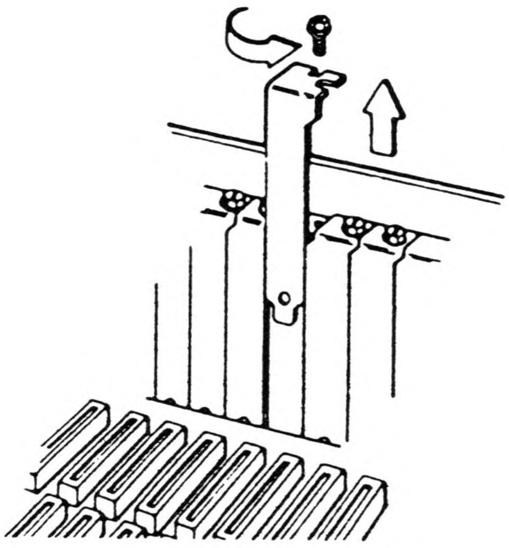


Figure 6: Removing The Slot Cover

NOTE: If you are going to install the Magic I/O into short slot 8 of the IBM XT, you must connect the System Select jumper as on CS.

5. Gently, but firmly, insert the Mini Magic I/O card all the way into the expansion slot.

6. Use the screw which you removed from expansion slot cover to secure the Mini Magic I/O in place.

7. If you will be using the parallel port or either serial port, you should plug the appropriate device into the appropriate port (connector).

TESTING THE MINI MAGIC I/O

Included in your Mini Magic I/O Utility diskette is a program which will check to see if the jumpers and switches have been set properly. This program will only take a few minutes to run and will assure you that the installation has been performed properly and that all of the chips on your Mini Magic I/O are good. You will need to run the DOS diagnostics utility Setup before you can run the test program. Once the SETUP program has been run, you should perform the Mini Magic I/O utility test.

To run the Mini Magic I/O test:

1. Boot your system with DOS, insert the Mini Magic I/O utility diskette into drive A, and type:

   A:EV170

2. The Mini Magic I/O main menu will appear on the screen. This time, chose the Test Chip Functions option. Go through each Chip Test. The chips will be tested sequentially. The chips under evaluation will blink, in the diagram on your screen, until they have been tested and their status is displayed on the screen.

Congratulations! You have completed your installation. Reinsert the cover of your computer, and it will be ready for use.

If you are using an AT, you will need to run the **Setup** utility at this point.

Appendix I: The Everclock

Your PC, XT or compatible system requires special software, EVECLOCK, in order to recognize and use its clock/calendar. To install this program onto your system:

1. Use the DOS commands TIME and DATE to set the correct time and date in your system. Remember to use 24-hour military time in setting the clock (for example, 3:30 pm equals 15:30 in 24-hour time).

2. Insert the Magic I/O utility diskette in drive A. At the A> prompt, type:

   ```
   sclock <ENTER>
   ```

   This program stores the correct time and date from your system (DOS) into the Magic I/O's clock chip.

3. Copy the program EVECLOCK.COM from the Magic I/O utility diskette into the root directory of your system disk.

4. Once the correct time and date have been stored by your Magic I/O, they will be automatically kept and updated even when your computer is turned off. However, in order for the system (DOS) to stay current, it must read the time and date from the Magic I/O each time you boot up. If an AUTOEXEC.BAT is present in your root directory, it will be read whenever the system is booted up. Therefore, by placing the EVECLOCK.COM program in your AUTOEXEC.BAT file this is accomplished for you automatically.

   If you already have an AUTOEXEC.BAT file present on your system disk, add the line **eveclock** to this file. If you do not already have such a file, create one, in your root directory that contains the following lines:

   ```
   copy con autoexec.bat <ENTER>
   eveclock <ENTER>
   ```

6. The commands in the autoexec.bat file will be executed each time you boot up. To start the Everclock software, re-boot your system.

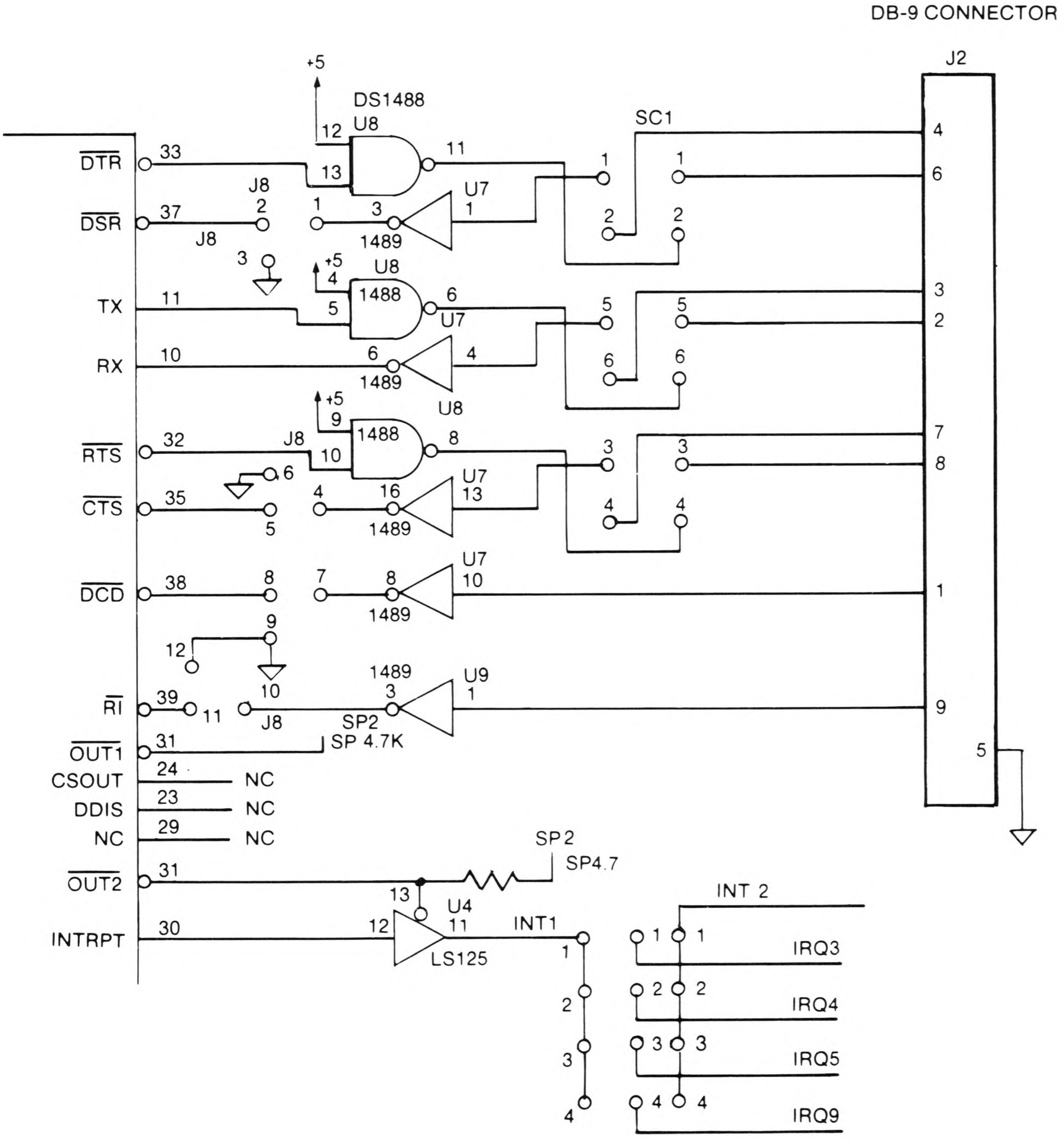
Appendix II: PC-Write

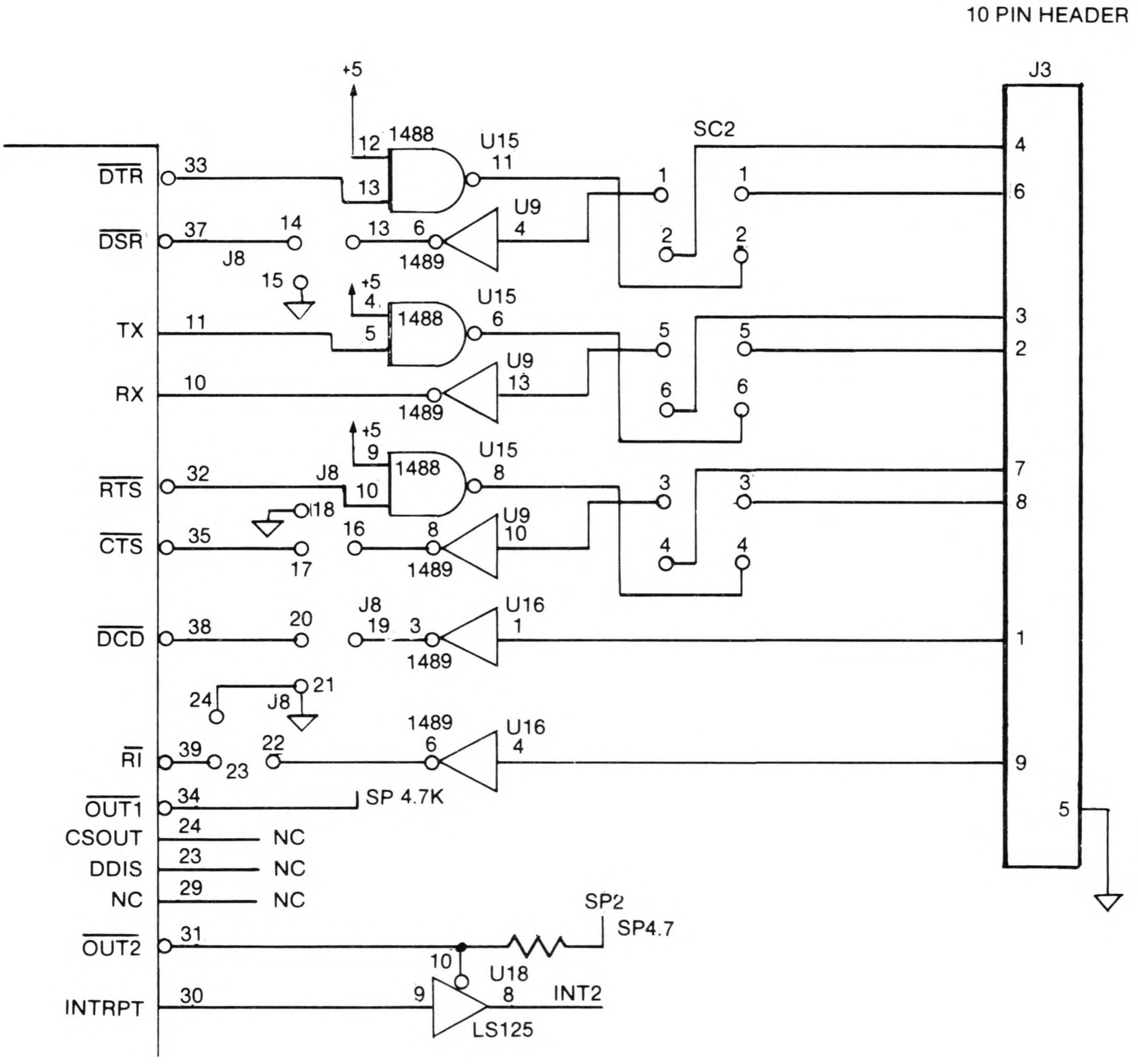
Included with your Mini Magic I/O is a word processing program, PC-Write.other two are editing programs. The manual for PC WRITE is on your utility diskette. If you wish to use this utilities, you should type:

TYPE READ.ME

Appendix III: Handshaking Schematic

The following portion of the Magic I/O's schematic diagram details the handshaking functions performed by the DTE/DCE and force-true jumpers.




10 PIN HEADER
J3
+5
U15
SC2
$\overline{\text{DTR}}$
U9
$\overline{\text{DSR}}$
J8
+5
U15
TX
U9
RX
+5
U15
$\overline{\text{RTS}}$
J8
U9
$\overline{\text{CTS}}$
J8
U16
$\overline{\text{DCD}}$
J8
U16
$\overline{\text{RI}}$
$\overline{\text{OUT1}}$
SP 4.7K
CSOUT
NC
DDIS
NC
NC
NC
SP2
SP4.7
$\overline{\text{OUT2}}$
U18
INTRPT
INT2
LS125

Notes

EVEREX SYSTEMS, INC.
48431 MILMONT DRIVE
FREMONT, CA 94538

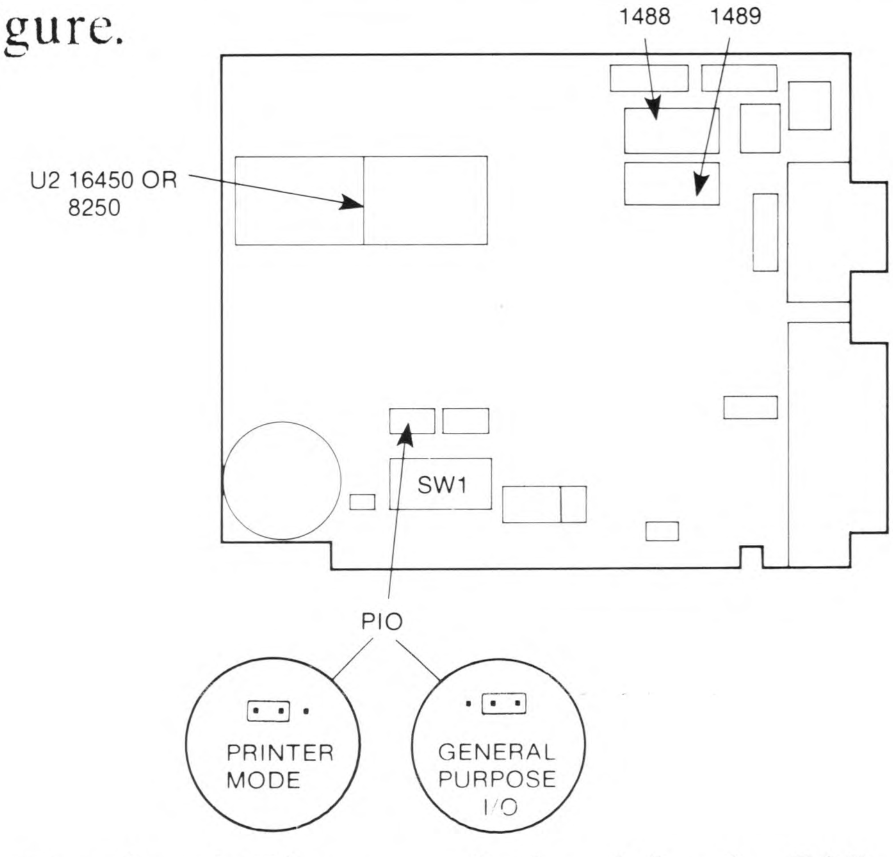
(415) 498-1111
FAX: (415) 651-0728
TELEX: 5101000590

Addendum

This addendum contains updated information concerning your new Magic I/O (EV-170 and EV-170A).

REVISED FIGURE

The jumper connection PIO on the Magic I/O board is not pointed out in Figure 1 on page 10 of the manual. PIO is a 3-pin connector that selects whether the parallel port will be in the printer mode (default configuration) or a bi-directional general purpose I/O port. You do not need to change this setting if you would like the parallel port to remain in printer mode, however, if you want to change the port to a general purpose I/O port, configure it according to the following figure.



Revised Figure of the Magic I/O

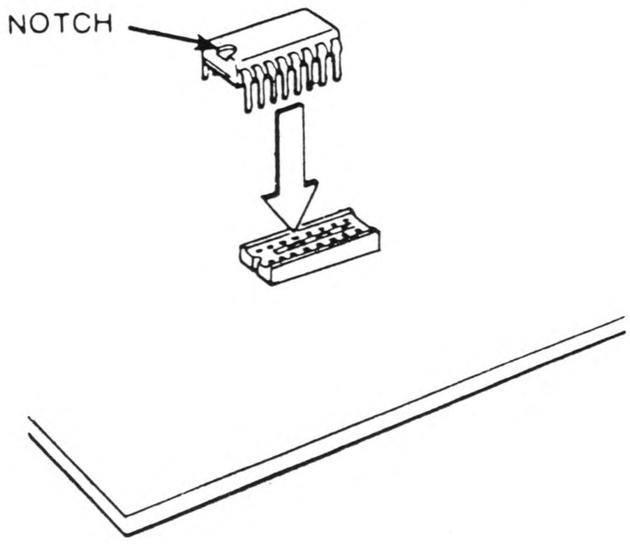
CONFIGURING THE OPTIONAL SERIAL PORT

The optional serial port is the 10-pin connector at J3. This serial port requires upgrading the Magic I/O with three additional chips. The three chips are labeled:

1. 16450 (for the AT) or 8250 (for the XT)
2. 1488
3. 1489

Please refer to the revised figure on the previous page for the location of each of these chips. The chips have a pin 1 which is marked with a notch or a dot (refer to the figure below).

If you look carefully at the Magic I/O board, each chip socket has the outline of a notched chip in the proper orientation. Be sure to insert the chip following this orientation.



Installing the Additional Serial Port Chips

To Install A Chip:

1. Insert the tips of the pins into the holes in the socket.

2. Double-check that the alignment is exactly right and press the chip into place.

Now the optional serial port is enabled, and you can attach the 10-pin female connector of the ribbon cable to the serial port at J3.

EVEREX SYSTEMS, INC.
48431 MILMONT DRIVE
FREMONT, CA 94538

(415) 498-1111
FAX: (415) 651-0728
TELEX: 5101000590

MAN-00036-22